

PATENT SPECIFICATION

656,209



Date of Application and filing Complete Specification: Oct. 4, 1948.

No. 25763/48.

Complete Specification Published: Aug. 15, 1951.

Index at acceptance:—Classes 44, E1; and 46, E1.

COMPLETE SPECIFICATION

Quickly Removable Filter Casing Cover

We, FRAM CORPORATION, of 55, Pawtucket Avenue, East Providence, Rhode Island, United States of America, a corporation organized and existing under the laws of the State of Rhode Island, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a filter of a type usually used in connection with automotive engines although the same may have various other uses.

In the previous construction of a filter, there is usually provided a casing having a center tube through which the filtrate is discharged with an inlet opening into the casing for the oil or liquid to be filtered. About the center tube a cartridge having a center opening is removably positioned and a cover is provided which has a bolt or the like entering the upper threaded end of the center tube to hold it in place. By this arrangement, in order to change the cartridge it is necessary to loosen the bolt with a wrench to withdraw the cartridge from the center tube and to drain the casing from deposited contaminant prior to the insertion of a fresh cartridge in position.

It is found in the operation of a filter of this construction that it is necessary to reinforce the bottom wall or make the same of a very heavy gauge material in order to withstand the strains which are placed upon the center tube by some attendants in excessively tightening the bolt to hold the cover in place. It is also found necessary to very accurately finish the upper edge of the casing and provide a washer along this edge in order to maintain a tight seal between the cover and the edge of the casing.

One of the objects of this invention is to provide an arrangement whereby the cover may be more quickly removed and

replaced than by the use of a bolt and wrench as now commonly occurs.

Another object of this invention is to provide a construction of filter which will make unnecessary the provision of a center tube for securing the cover in place, thus making it unnecessary to reinforce or strengthen the bottom of the casing against strains which are placed upon the bottom of the casing through the center tube in using the center tube for securing the cover in place.

Another object of the invention is to provide a cover arrangement which will make unnecessary the accurate finishing of the upper edge of the casing for engagement by a soft washer or seal.

Another object of the invention is to eliminate the use of any threads which may be stripped by careless handling or excessive force being applied to the parts which carry the threads.

Another object of the invention is to provide a soft sealing ring which may be utilized many times in taking off or putting on the cover without the necessity of putting in a new washer such as previously was frequently desirable when the cover was removed and replaced.

Another object of the invention is to provide a sufficient space within the filter casing so that the same may be wiped out with a piece of waste or rag by hand eliminating the necessity of providing a drain opening through the bottom wall of the casing.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a perspective view of the filter which is the subject of this invention;

Fig. 2 is an exploded perspective view illustrating the cover and the casing in separated relation;

Fig. 3 is a central sectional view through the filter shown in Fig. 1;

Fig. 4 is a sectional view showing the casing alone with the cartridge removed, and

Fig. 5 is a fragmental view showing a locking arrangement for the cover of the casing.

In proceeding with this invention, we provide a casing having inlet and outlet openings and a bottom wall and a cylindrical side wall with an open end in which a cartridge may be positioned and we provide a cover for the open end with a flange which telescopes the casing, there being formed projections on the telescoping portions of the casing and flange which are spaced circumferentially so that in one position the projections on the flange may pass by the projections on the side wall of the casing and then by relative rotation a part of a revolution the projections are brought one beneath the other so as to lock the cover in place. Some slight helical relation may be provided between the projections so that as the turning occurs the cover is drawn inwardly toward the open end of the body. By knurling the outer surface of the cover, the same may be firmly gripped by the hand so that no wrench is needed. A soft sealing member is positioned between the flange of the cover and the upper end portion of the side wall of the casing.

With reference to the drawings, the casing comprises a body designated generally 10 and shown by itself in Fig. 4. This casing has a bottom wall 11 of a generally bulbous shape something along the lines of the shape of a portion of a sphere and a cylindrical side wall 12. A spud 13 is secured in a hole through the bottom wall and there is formed an outlet bore 14 having an enlarged threaded portion 15 to which a conduit may be attached. This spud is secured in the bottom wall by welding or in any suitable manner to provide a liquid tight connection. This spud is also shouldered as at 16 by the formation of a reduced portion so that a soft gasket or washer 17 may be provided and held on the shoulder. An inlet opening is provided in the side wall 12 by means of the boss 18 having a threaded opening 19 to which a conduit may be attached. The upper edge or end of the side wall is rolled inwardly slightly at 20 and projections 21 are formed by deflecting the stock of the side wall 12 outwardly so as to provide recesses 22 on the inner surface as the projections 21 are formed on the outer surface. These projections are illustrated as four in number and are spaced circularly about the upper edge of the side wall 12 a distance a little greater

than the extent of the projections themselves.

A filtering medium in the form of a cartridge 25 is provided and while this may take various different forms, the particular form chosen for illustration comprises a cylindrical shell 26 which is perforated along its side walls and is provided with a fibrous material 27 such as cotton waste. The end walls of the shell are illustrated at 28 and 29 and are imperforate. A center opening is provided by means of a perforated tube 30 so that the liquid to be filtered will pass into the element through the wall 26 through the waste and out through the perforations in the tube 30. This shell so formed sits upon the soft washer 17 so as to provide a seal for this end of the cartridge about the center opening while the other end of the center opening is sealed by means carried by the cover.

The cover is designated generally 32 and comprises a top wall 33 and a flange designated generally 34. This flange is deflected inwardly as at 35 so as to provide a circular rib projecting inwardly of the flange and spaced from the flattened portion of the cover 36 which extends around the margin of the domed portion thereof. Between this rib 35 and the portion 36 of the cover an elastic O-ring 37 is provided which is of neoprene or some synthetic rubber-like material which will not be attacked by the oil or other liquid which is to be filtered. This ring is of circular cross section and its diameter is less than the distance between the inner surface of the rib 35 and the inner surface of the portion 36 of the cover so that this ring may roll axially between these two surfaces which form stop means.

The flange 34 is also provided with inwardly extending projections 38, which are of an extent similar to the extent of the projections 21 and are of such length that they will pass through the spaces between the projections 21 on the body. They are similar to the projections 21 in number and may also be inclined on the upper edges 39 so that when the cover is placed on the body with the projections 38 passing through the spaces between the projections 21 and the cover is rotated clockwise looking at the upper end thereof, then the cover will be drawn downwardly on the casing, at which time the O-ring packing will roll along the outer surface of the casing above the projections 21. These projections extend outwardly at one end 39' to provide a stop and limit the rotation of the cover on the casing.

Centrally located within the cover 32 is a spring 40 which is secured to a washer 13

41 which in turn is spot welded to the inner surface of the cover. At the other end of the spring a cup 42 is provided which is secured to the spring by reason of the spring passing snugly about it beneath a flanged end while there is a washer 43 encircling the cup beneath which there is a soft packing or gasket 44 which is of some rubber-like or soft material similar to gasket 17. This cup fits within the center opening in the cartridge and the soft packing engages the edge of the tube 30. The pressure of the spring 40 exerts sufficient force so that a tight seal is formed. However, in some cases a bleed hole 45 may be provided in the bottom of the cup for the by-passing of oil therethrough, for instance, where it is desired that some heating of the casing take place at the commencement of filtration.

In use, oil will enter at the boss 18 and fill the casing. The oil being under pressure will exert some pressure on the O-ring driving it down against the circular rib 35 and then expanding it into sealing relation, and as the oil is under pressure some oil may pass through the bleed hole 45 to establish a circulation so that warming of the casing may take place. The oil will, as it becomes sufficiently warm, pass through the filter cartridge 25 and will pass from the casing through the conduit 14 and threaded connection 15.

If it is desired to remove the cartridge and replace it by a fresh one, it is merely necessary to grasp the knurled portion 46 of the cover in the hand and turn the same a fraction of a revolution, which may be substantially 35 or 40 degrees so as to bring the projections 38 in the space between the projections 21; then the cover may be lifted from position, the cartridge, lifted by handle 47, inspected, and if found sufficiently contaminated it will be removed from the casing and a fresh one placed therein and in either case, whether the old cartridge is returned or a fresh cartridge is placed in position, it is merely necessary to cause the flange 34 of the cover to telescope the upper edge of the side wall 12 of the casing and then turn the cover to bring the projections 38 beneath the projections 21 for securing the cover in place.

The cover is of a size so that the cartridge may be placed within its flange after the cartridge is drawn from the casing so that the attendant at an oil station may show to the driver the condition of the cartridge that he may be the judge as to whether or not it needs to be replaced.

As the cover, is in one piece with a deep flange, no oil will drop as this operation is performed. The removal for inspection may be made within one minute's time, whereas removing a bolt by a wrench and replacing it would take many times as long and the same presentation to the driver in the cover which has a bolt passing through it and from which oil would drop, could not be made.

In some cases where a locking of the cover against rotation relative to the casing is desired, we recess the cover flange 34 as at 50 (see Fig. 5) and weld a resilient arm 51 to the side wall 12 of the casing which has a portion to enter this recess to prevent rotation of the cover. If this arm is sprung outwardly about its reduced portion 52, the cover is released so that it may be turned to remove it from the case 10.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. A filter comprising a casing having a bottom wall and a cylindrical side wall with an open upper end, inlet and outlet openings in said casing, a filtering medium between said inlet and outlet openings for the passage through the filtering medium of the liquid to be filtered, said filtering medium being in the form of a cartridge which is removable from the casing through its upper end, a removable cover having a flange telescoping over the upper end portion of said side wall, means carried by said flange and the upper end portion of the side wall whereby the cover may be removably secured on the casing by rotation through a fraction of a revolution of the cover relatively to the casing, and a soft sealing member which is positioned between the flange of the cover and the upper end portion of the said side wall.

2. A filter as claimed in claim 1, wherein the sealing member is an O-ring.

3. A filter as claimed in Claim 2, wherein the casing has an abutment permitting axial rolling of the O-ring to a limited extent only.

4. A filter as claimed in any of Claims 1 to 3, wherein said filtering medium has an axial passageway therethrough and the cover carries means sealing the upper end of said axial passageway.

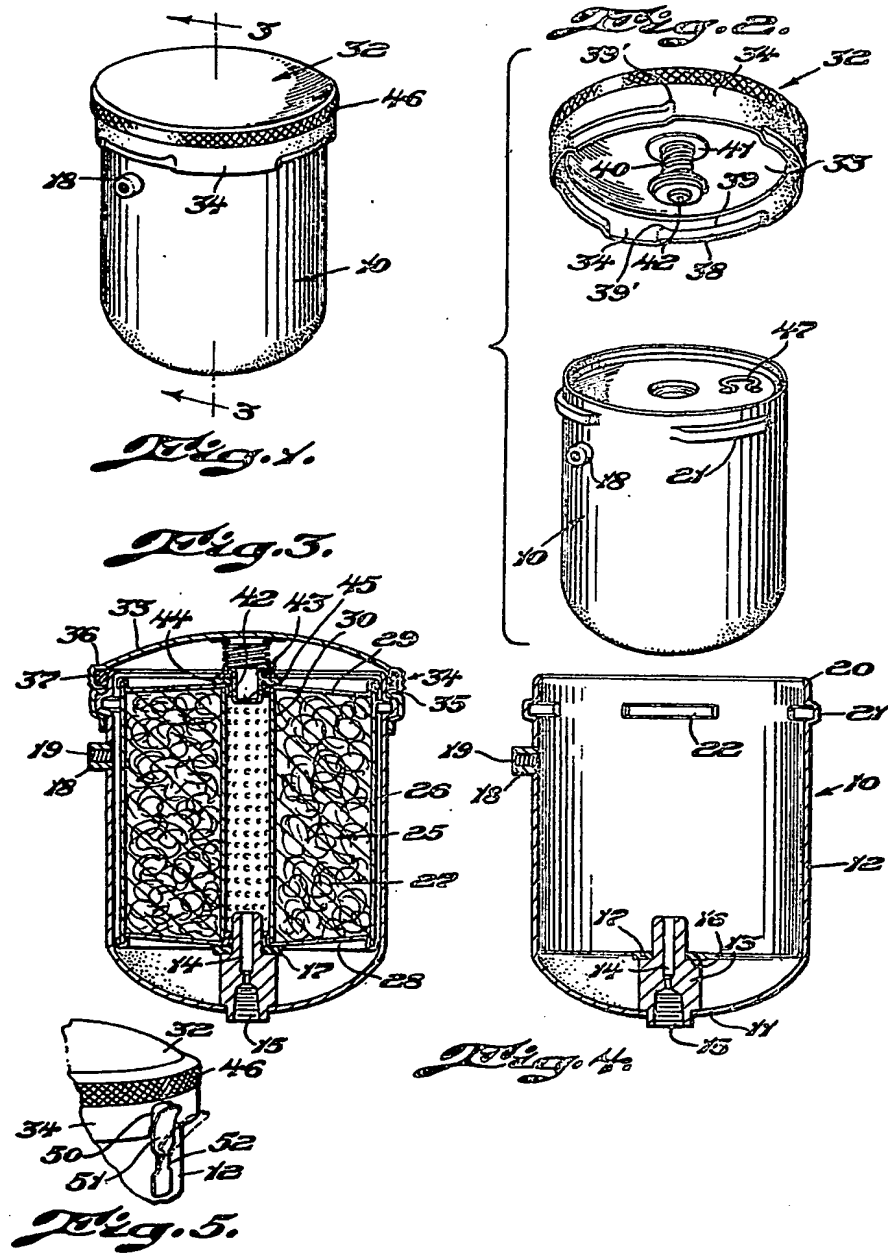
5. A filter constructed and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 4th day of October, 1948.

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Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1951.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which
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